Twickenham Riverside

Internal Daylight, Sunlight and Overshadowing Report

LONDON BOROUGH OF RICHMOND UPON THAMES

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CHARTERED SURVEYORS

DAYLIGHT & SUNLIGHT

INTERNAL DAYLIGHT, SUNLIGHT AND OVERSHADOWING REPORT

Twickenham Riverside

28 July 2021

GIA No: **17085**

PROJECT DATA:

Client	**London Borough Richmond Upon Thomas (LBRUT)**
Architect	**Hopkins Architects**
Project Title	**Twickenham Riverside**
Project Number	**17085**

REPORT DATA:

Report Title	**Internal Daylight, Sunlight and Overshadowing Report**
GIA Department	**Daylight & Sunlight**
Dated	**28 July 2021**

Prepared by	**ERLA**
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Map data

CONTENTS

1 EXECUTIVE SUMMARY

The purpose of this report is to ascertain whether the proposed development will offer acceptable daylight and sunlight amenity for the enjoyment of future occupants.

To this end, all habitable rooms within the scheme have been technically assessed for daylight quantity (by means of ADF) and distribution (by means of NSL and RDC). In addition, all room have been assessed for their access to sunlight both annually (APSH) and in winter (WPSH). Finally, all outdoor areas of public or communal amenity have been tested for overshadowing through the Sun Hours on Ground metric (SHOG).

The proposed development is comprised of two buildings, Wharf Lane Building to the south and Water Lane Building to the north, surrounding the external shared amenity space of the Diamond Jubilee Gardens.

Overall, the results show that the proposal will provide future occupants with acceptable levels of daylight with 87 (83%) out of all 105 habitable rooms meeting or exceeding the levels of ADF recommended by BRE, and all rooms achieving the recommended level for sky visibility (No-Sky Line, or NSL).

Of the rooms tested 39 are large open space Living/Kitchen/Dining rooms (L/K/Ds), six are studios and 60 are bedrooms. The 18 rooms falling short are comprised of 11 L/K/Ds, five bedrooms and two studios.

Both of the studios falling short are located behind balconies and achieve between 1.5% and 1.7% ADF though which is above the 1.5% recommended for living areas. As such, these rooms can be considered acceptably daylit living areas.

The L/K/Ds seeing lower levels of ADF do so predominantly owing to the positioning of these rooms behind recessed balconies which, whilst providing valuable private amenity space, inherently obstruct the levels of light reaching the rear of the rooms. However, the levels of light seen in the front of the room (designated as the living area) will be much higher than the figures quoted here. Overall, occupants will still be able to enjoy good levels of light in their living areas and very good levels of natural light both on their balconies and within their bedrooms (all of which see significantly greater levels of light than the 1% recommended).

All five bedrooms falling short of guidance are located at the gable ends of the top floors of both blocks where brise-soleils have been placed to mitigate overheating and provide the architectural feature suggested by the local authority. This will inherently affect the light seen in the rooms within the overcast condition. However, these bedrooms will all see good levels of sky visibility.

Finally, whilst it is normal for daylight reports to highlight the few (18) rooms falling short of recommendation it should be noted that more than half of the proposed rooms (58 of the 105) see excellent levels of light with ADF levels of 3% or greater.

In terms of sunlight, all south-facing living areas see excellent levels of sunlight both annually and in winter for the enjoyment of future occupants.

With regard to overshadowing, the proposal includes three external amenity areas for the enjoyment of future occupants and all three of these areas will see excellent levels of sunlight, well in excess of those recommended by BRE.

Overall, the proposed design is considered to perform acceptably in relation to natural light.

2 INTRODUCTION

GIA has been instructed to provide a report upon the potential availability of Daylight and Sunlight to the proposed accommodation within the residential scheme prepared by Hopkins Architects. GIA was specifically instructed to carry out the following:

- To create a 3D computer model of the proposal based upon drawings prepared by Hopkins Architects.
- Carry out a daylight assessment using the methodologies set out in the BRE guidance for Average Daylight Factor, No-Sky Line and Room Depth Criterion.
- Carry out a sunlight assessment using the methodologies set out in the BRE guidance for Annual Probable Sunlight Hours (APSH) to the fenestration facing within 90° of due south.
- Carry out an overshadowing assessment using the methodology set out in the BRE guidance for Sun Hours On Ground (SHOG) for all relevant amenity areas.
- Prepare a report setting out the analysis and our findings.

3 BRE GUIDELINES

The Building Research Establishment (BRE) have set out in their handbook 'Site Layout Planning for Daylight and Sunlight a Guide to Good Practice (2011)', guidelines and methodology for the measurement and assessment of daylight and sunlight within proposed buildings.

The guide also provides advice on site layout planning to determine the quality of daylight and sunlight within open spaces between buildings.

It is important to note, however, that this document is a guide and states that its aim *"is to help rather than constrain the designer"*.

The document provides advice, but also clearly states that it *"is not mandatory and this document should not be seen as an instrument of planning policy."* The report also acknowledges in its introduction that *"in special circumstances the developer or planning authority may wish to use different target values. For example, in a historic city centre a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings."*

It is an inevitable consequence of the built up urban environment that daylight and sunlight will be more limited in these areas. It is well acknowledged that in such situations there may be many other conflicting and potentially more important planning and urban design matters to consider other than just the provision of ideal levels of daylight and sunlight.

3.1 DAYLIGHT

The BRE set out various methods for assessing the daylight within a proposed building within section 2.1 and Appendix C of the handbook. These are summarised below.

Vertical Sky Component (VSC)

This method of assessment can be undertaken using a skylight indicator or a Waldram diagram. It measures from a single point, at the centre of the window (if known at the early design stage), the quantum of sky visible taking into account all external obstructions. Whilst these obstructions can be either other buildings or the general landscape, trees are usually ignored unless they form a continuous or dense belt of obstruction.

The VSC method is a useful 'rule of thumb' but has some significant limitations in determining the true quality of daylight within a proposed building. It does not take into account the size of the window, any reflected light off external obstructions, any reflected light within the room, or the use to which that room is put. Appendix C of the guide goes into more detail on these matters and sets forward alternative methods for assessment to overcome these limitations.

Appendix C of the BRE guide: Interior Daylighting Recommendations, states:

"The British Standard Code of practice for daylighting (BS 8206-2) and the CIBSE Lighting Guide LG 10 Daylighting and window design contain advice and guidance on interior daylighting. The guidance contained in this publication (BR 209) is intended to be used with BS 8206-2 and LG 10. Both these publications refer to BR 209.

For skylight BS 8206-2 and LG 10 put forward three main criteria, based on average daylight factor (ADF); room depth; and the position of the no sky line."

These assessments are set out below.

Average Daylight Factor (ADF)

"If a predominantly daylit appearance is required, then the ADF should be 5% or more if there is no supplementary electric lighting, or 2% or more if supplementary electric lighting is provided. There are additional recommendations for dwellings of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms.

These additional recommendations are minimum values of ADF which should be attained even if a predominantly daylit appearance is not achievable."

This method of assessment takes into account the total glazed area to the room, the transmittance quality of the glazing proposed, the total area of the room surfaces including ceilings and floors, and the internal average reflectance for the room being assessed. The method also takes into account the Vertical Sky Component and the quantum of reflected light off external surfaces.

This is, therefore, a significantly more detailed method of assessment than the Vertical Sky Component method set out above.

Room Depth Criterion (RDC)

Where it has access to daylight from windows in one wall only, the depth of a room can become a factor in determining the quantity of light within it. The BRE guidance provides a simple method for examining the ratio of room depth to window area. However, whilst it does take into account internal surface reflections, this method also has significant limitations in that it does not take into account any obstructions outside the window and therefore draws no input from the quantity of light entering the room.

No Sky Line (NSL)

This third method of assessment is a simple test to establish where within the proposed room the sky will be visible through the windows, taking into account external obstructions. The assessment is undertaken at working plane height (850mm above floor level) and the method of calculation is set out in Appendix D of the BRE handbook.

Appendix C of the BRE handbook states *"If a significant area of the working plane (normally more than 20%) lies beyond the no sky line (ie it receives no direct skylight) then the distribution of daylight in the room will look poor and supplementary electric lighting will be required."* To guarantee a satisfactory daylight uniformity, the area which does not receive direct skylight should not exceed 20% of the floor area, as quantified in the BS 8206 Part2 2008.

Summary

The Average Daylight Factor gives a more detailed assessment of the daylight within a room and takes into account the highest number of factors in establishing a quantitative output.

However, the conclusion of Appendix C of the BRE guide states:

"[All three of] the criteria need to be satisfied if the whole of the room is to look adequately daylit. Even if the amount of daylight in a room (given by the Average Daylight Factor) is sufficient, the overall daylight appearance will be impaired if its distribution is poor."

In most urban areas it is important to recognise that the distribution of daylight within a room may be difficult to achieve, given the built up nature of the environment. Consequently, most local authorities seek to ensure that there is sufficient daylight within the room as determined by the Average Daylight Factor calculation. However, the additional recommendations of the BRE and British Standard for residential accommodation, set out above, ought not to be overlooked.

3.2 SUNLIGHT

The BRE provide guidance in respect of sunlight quality for new developments within section 3.1 of the handbook. It is generally acknowledged that the presence of sunlight is more significant in residential accommodation than it is in commercial properties, and this is reflected in the BRE document.

It states, *"in housing, the main requirement for sunlight is in living rooms, where it is valued at any time of the day, but especially in the afternoon. Sunlight is also required in conservatories. It is viewed as less important in bedrooms and in kitchens where people prefer it in the morning rather than the afternoon."*

The BRE guide considers the critical aspects of orientation and overshadowing in determining the availability of sunlight at a proposed development site.

The guide proposes minimizing the number of dwellings whose living room face solely north unless there is some compensating factor such as an appealing view to the north, and it suggests a number of techniques to do so. Further more, it discusses massing solutions with a sensitive approach to overshadowing, so as to maximize access to sunlight.

At the same time it acknowledges that the site's existing urban environment may impose orientation or overshadowing constraints which may not be possible to overcome.

To quantify sunlight access for interiors where sunlight is expected, it refers to the BS 82606-2 criterion of Annual Probable Sunlight Hours. APSH is defined as *"the total number of hours in the year that the sun is expected to shine on unobstructed ground, allowing for average levels of cloudiness at the location in question."* In line with the recommendation, APSH is measured from a point on the inside face of the window, should the locations have been decided. If these are unknown, sunlight availability is checked at points 1.6m above the ground or the lowest storey level on each main window wall, and no more than 5m apart. If a room has multiple windows on the same wall or on adjacent walls, the highest value of APSH should be taken into account. If a room has two windows on opposite walls, the APSH for each can be added together.

The summary of section 3.1 of the guide states as follows:

"In general, a dwelling or non-domestic building which has a particular requirement for sunlight, will appear reasonably sunlit provided that:

- *At least one main window faces within 90 degrees of due south, and*
- *The centre of at least one window to a main living room can receive 25% of annual probable sunlight hours, including at least 5% of annual probable sunlight hours in the winter months between 21 September and 21 March. "*

In paragraph 3.1.11 the BRE guidance suggests that if a room faces significantly North of due East or West it is unlikely to meet the recommended levels proposed by the BS 8206-2. As such, it is clear that only windows facing within 90 degrees of due South can be assessed using this methodology.

It is also worth noting how paragraph 5.3 of the BS 8206-2 suggests that with regards to sunlight duration *"the degree of satisfaction is related to the expectation of sunlight. If a room is necessarily north facing or if the building is in a densely-built urban area, the absence of sunlight is more acceptable than when its exclusion seems arbitrary"*.

3.3 OVERSHADOWING

The BRE guidance in respect of overshadowing of amenity spaces is set out in section 3.3 of the handbook. Here it states as follows:

"Sunlight in the spaces between buildings has an important impact on the overall appearance and ambiance of a development. It is valuable for a number of reasons, to:

- *provide attractive sunlit views (all year)*
- *make outdoor activities, like sitting out and children's play more pleasant (mainly warmer months)*
- *encourage plant growth (mainly spring and summer)*
- *dry out the ground, reducing moss and slime (mainly in colder months)*
- *melt frost, ice and snow (in winter)*
- *dry clothes (all year)"*

Again, it must be acknowledged that in urban areas the availability of sunlight on the ground is a factor which is significantly controlled by the existing urban fabric around the site in question and so may have very little to do with the form of the development itself. Likewise there may be many other urban design, planning and site constraints which determine and run contrary to the best form, siting and location of a proposed development in terms of availability of sun on the ground.

The summary of section 3.3 of the guide states as follows:

"3. 3 .17 It is recommended that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21 March. If as a result of new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable. If a detailed calculation cannot be carried out, it is recommended that the centre of the area should receive at least two hours of sunlight on 21 March."

3.4 FURTHER RELEVANT INFORMATION

Further information can be found in The Daylight in Urban Areas Design Guide (Energy Saving Trust CE257, 2007) which provides the following recommendation with regards to VSC levels in urban areas:

"If 'theta' (Visible sky angle) is greater than 65° (obstruction angle less than 25° or VSC at least 27 percent) conventional window design will usually give reasonable results.

If 'theta' is between 45° and 65° (obstruction angle between 25° and 45°, VSC between 15 and 27 percent), special measures such as larger windows and changes to room layout are usually needed to provide adequate daylight.

If 'theta' is between 25° and 45° (obstruction angle between 45° and 65°, VSC from 5 to 15 percent), it is very difficult to provide adequate daylight unless very large windows are used.

If 'theta' is less than 25° (obstruction angle more than 65°, VSC less than 5 percent) it is often impossible to achieve reasonable daylight, even if the whole window wall is glazed."

4 METHODOLOGY

In order to undertake the daylight and sunlight assessments set out in the previous pages, we have prepared a three dimensional computer model and used specialist lighting simulation software.

The three dimensional representation of the proposed development has been modelled using the scheme drawings provided to us by Hopkins Architects. This has been placed in the context of its surrounding buildings which have been modelled from survey information, photogrammetry, OS and site photographs. This allows for a precise model, which in turn ensures that analysis accurately represents the amount of daylight and sunlight available to the building facades, internal and external spaces, considering all of the surrounding obstructions and orientation.

Subsequent to the completion of the assessments contained within this report, minor amendments were incorporated to the design. The unit layouts were not altered however, and the only alterations to window sizes were in relation to rooms with very high levels of light and as such the conclusions for these rooms remain as discussed within this report. With no alterations made to the windows of the few rooms falling short of recommendation and no alterations to well lit rooms significant enough to reduce their levels below those recommended by BRE, it can be concluded that these amendments would not alter the overall conclusions of this report.

4.1 SIMULATION ASSUMPTIONS

Where no values for reflectance, transmittance and maintenance factor were specified by the designer the following values from *BS 8206-2:2008, Annex A, tables A.1-A.6* were used for the calculation of Average Daylight Factor values. These values are shown in Table 1.

As per the design team's recommendation, a visible light transmittance of 0.65 (direct normal) has been adopted for the windows and a maintenance factor of 8% applied. The frames were modelled as per the architect's design and so no framing factor was applied to the light transmittance.

Table 01: Typical reflectance, transmittance and maintenance factors

REFLECTANCE VALUES:	
Surrounding	0.2
Pavement	0.2
Grass	0.1
Water	0.1
Yellow brick	0.3
Red brick	0.2
Portland Stone	0.6
Concrete	0.4
Internal walls (light grey)	0.68
Internal ceiling (white paint)	0.85
Internal floor (medium veneer)	0.3
Internal floor (light veneer)	0.4

TRANSMITTANCE VALUES	TV
Triple glazing (Low-E): Pilkington K Glass 4/12/4/12/4 Argon filled 90%	0.63
Double glazing (Low-E): Pilkington K Glass 4/16/4 Argon filled 90%	0.75
Single glazing: Pilkington Optifloat Clear 4mm Annealed	0.90
Translucent glazing (Low-E): Pilkington Optifloat Opal - 4mm K /16/4mm Opal	0.74

MAINTENANCE FACTORS: GLAZING TYPE	TV (Normal)	A.3	A.4	A.5	A.6	TV (Total)
Triple Low-E (frames modelled)	0.63	8	1	1	1	0.58
Triple Low-E (frames not modelled)	0.63	8	1	1	0.8	0.46
Triple Low-E (inclined, frames modelled)	0.63	8	2	1	1	0.53
Triple Low-E (inclined, frames not modelled)	0.63	8	2	1	0.8	0.42
Triple Low-E (horizontal, frames modelled)	0.63	8	3	1	1	0.48
Triple Low-E (horizontal, frames not modelled)	0.63	8	3	1	0.8	0.38
Double Low-E (frames modelled)	0.75	8	1	1	1	0.69
Double Low-E (frames not modelled)	0.75	8	1	1	0.8	0.55
Double Low-E (inclined, frames modelled)	0.75	8	2	1	1	0.63
Double Low-E (inclined, frames not modelled)	0.75	8	2	1	0.8	0.50
Double Low-E (horizontal, frames modelled)	0.75	8	3	1	1	0.57
Double Low-E (horizontal, frames not modelled)	0.75	8	3	1	0.8	0.46
Single (frames modelled)	0.9	8	1	1	1	0.83
Single (frames not modelled)	0.9	8	1	1	0.8	0.66
Single (inclined, frames modelled)	0.9	8	2	1	1	0.76
Single (inclined, frames not modelled)	0.9	8	2	1	0.8	0.60
Single (horizontal, frames modelled)	0.9	8	3	1	1	0.68
Single (horizontal, frames not modelled)	0.9	8	3	1	0.8	0.55
Double Translucent Low-E (frames modelled)	0.74	8	1	1	1	0.68
Double Translucent Low-E (frames not modelled)	0.74	8	1	1	0.8	0.54
Double Translucent Low-E (inclined, frames modelled)	0.74	8	2	1	1	0.62
Double Translucent Low-E (inclined, frames not modelled)	0.74	8	2	1	0.8	0.50
Double Translucent Low-E (horizontal, frames modelled)	0.74	8	3	1	1	0.56
Double Translucent Low-E (horizontal, frames not modelled)	0.74	8	3	1	0.8	0.45

5 CONCLUSIONS

The proposed development is comprised of two buildings, Wharf Lane Building to the south and Water Lane Building to the north, surrounding the external shared amenity space of the Diamond Jubilee Gardens.

5.1 CONCLUSIONS ON DAYLIGHT

Overall, the results show that the scheme performs acceptably in relation to daylight. Of the 105 assessed rooms:

- 87 (83%) meet or exceed the recommendations for daylight quantity (ADF);
- All rooms meet or exceed the recommendation for sky visibility (NSL);
- The vast majority of rooms have been designed with good proportions for uniform light distribution according to the BRE's RDC, where applicable;

Of the rooms tested 39 are large open space Living/Kitchen/Dining rooms (L/K/Ds), six are studios and 60 are bedrooms. The 18 rooms falling short are comprised of 11 L/K/Ds, five bedrooms and two studios

Both of the studios seeing lower levels of daylight, achieve 1.5% ADF which is in line with the recommended level for living areas. Whilst these large rooms fall slightly short of the higher 2% target for rooms with a kitchen included, this is partly a function of their size in conjunction with their position behind recessed balconies and in these cases, slightly lower levels of light must be expected. These rooms can be considered acceptably daylit living areas and so acceptably daylight overall, especially with regard to the exceptionally light levels of NSL (97%).

In relation to the 11 L/K/Ds falling short of the 2% recommended for rooms with a kitchen, four of these are similar to the studios discussed above in that they achieve 1.6-1.9% ADF which is above the 1.5% recommended for living areas. These rooms also see very high levels of NSL (96-98%) and so should be considered acceptably daylit living areas.

There are therefore only seven L/K/Ds proposed which see levels of ADF below the 1.5% recommended for living areas and all seven of these are located looking east, at the first floor of the Water Lane Building. These rooms see either 0.9% or 1% ADF (which is in line with the 1% target for bedrooms) and 97-99% NSL. Despite the very high NSL, lower levels of ADF can be seen predominantly owing to the positioning of these living areas behind recessed balconies which, whilst provide valuable private amenity space, inherently obstruct the levels of light reaching the rear of the rooms. This, however, is an expected consequence of locating large rooms behind recessed balconies and the levels of light seen in the front of the room (designated as the living area) will be much higher than the figures quoted here. Overall, whilst lower levels of light will be seen within these units' living areas, occupants will still be able to enjoy good levels of light in their living areas and very good levels of natural light both on their balconies and within their bedrooms (all of which see significantly greater levels of light than the 1% recommended).

All five bedrooms falling short of guidance are located at the gable ends of the top floors of both blocks where brise-soleils have been placed to mitigate overheating and provide the architectural feature suggested by the local authority. This will inherently affect the light seen in the rooms within the overcast condition. However, these bedrooms will all see good levels of sky visibility.

The vast majority of the rooms meet the Room Depth Criteria with the exception of nine which exceed the depth recommended owing to the combined Living Kitchen Dining feature of the design. Despite this increased depth, however, these rooms see very good levels of NSL (97-98%).

Finally, whilst it is normal for daylight reports to highlight the few (18) rooms falling short of recommendation it should be noted that more than half of the proposed rooms (58 of the 105) see excellent levels of light with ADF levels of 3% or greater.

In conclusion, the levels of light seen within the proposed units are generally very good with lower levels of light only seen in a very few instances owing to shade from balconies. Overall, the proposed design is considered to perform acceptably in relation to daylight.

5.2 CONCLUSIONS ON SUNLIGHT

In order to ascertain the levels of sunlight seen within the proposed Development Plot, Annual Probable Sunlight Hours (APSH) assessments have been undertaken for all 105 rooms proposed and 60 of these are bedrooms, which the BRE Guidance defines as being less important for sunlight.

Of the 45 rooms remaining, 24 face within 90 degrees of due south so have a reasonable expectation of sunlight levels in line with BRE Guidance.

The conclusions below therefore consider the 24 L/K/Ds or Studios which face within 90 degrees of due south and so have an expectation of sunlight.

The assessments undertaken have shown that all of living areas with an expectation for sunlight will see levels of APSH significantly in excess of those recommended by BRE. As such, the proposed scheme is considered to perform very well in terms of sunlight.

5.3 CONCLUSIONS ON OVERSHADOWING

The three outdoor communal amenity spaces provided at ground level within the site have been assessed against BRE's recommendations (as set out in section 3.3 of this report).

All three areas are shown to well exceed BRE'S recommendation of 50% seeing at least two hours of sunlight on the equinox, with Area 3 area achieving 99% and the remaining two areas 100%

In the summer, when outdoor space ware most likely to be utilised, the sunlight availability continues to be excellent with all the areas receiving direct sunlight for six hours or more.

Given the above, the proposed development will offer excellent access to sunlight in all areas of amenity provided.

6 SITE OVERVIEW

Fig. 01: Top view

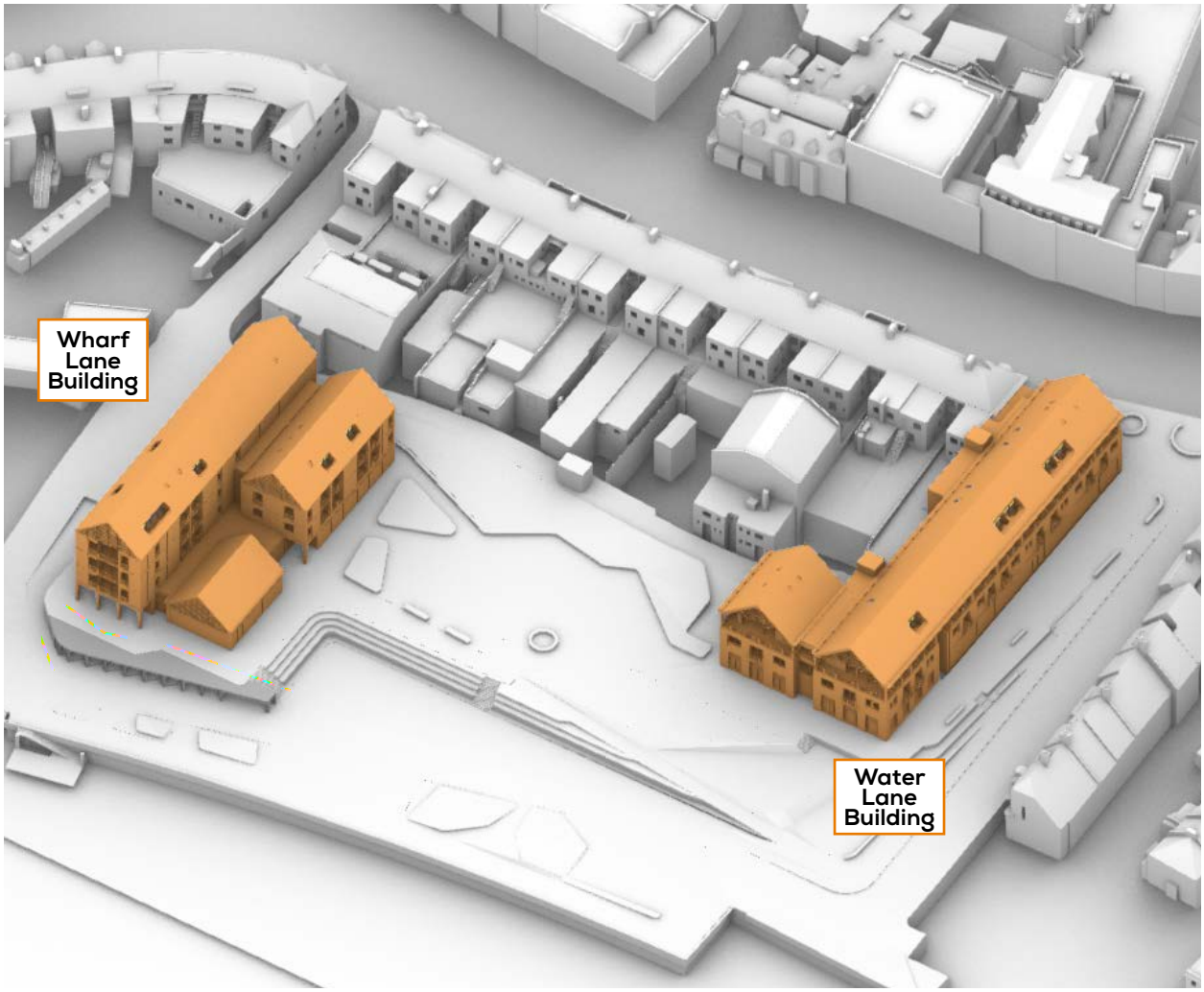


Fig. 02: Perspective view

7 INTERNAL DAYLIGHT AND SUNLIGHT ASSESSMENTS

KEY TO UNDERSTANDING THE TABLES - DAYLIGHT

DAYLIGHT QUANTUM

Average Daylight Factor (ADF)

Refers to the average percentage of daylight flux in a room against an external unobstructed plane.

BRE recommends ADF levels of 2% for rooms with kitchens (including LKDs and studios with kitchens), 1.5% for living rooms and studies, and 1% for bedrooms.

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION		SUNLIGHT QUANTUM (PROBABLE SUNLIGHT HOURS)	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC	ANNUAL	WINTER
Building C - SIXTH FLOOR						
686	L/K/D	2.8	99	N/A		
687	L/K/D	2.5	100	N/A	78	27
688	Bedroom	1.1	90	MET		
689	Bedroom	1.4	87	MET		
690	Bedroom	1.4	89	MET		
691	Bedroom	2	85	N/A		
692	Bedroom	1.6	82	MET		
693	Bedroom	1.4	95	MET		
694	Bedroom	1.6	98	MET		
695	Bedroom	2.2	93	N/A		
696	Living Room	2.6	100	N/A	56	24
697	Bedroom	2.5	100	N/A		
698	Bedroom	2.3	97	MET		
699	L/K/D	1.3	95	MET	57	28
700	Living Room	1.8	96	N/A	64	27
701	Bedroom	1.4	98	MET		
702	Living Room	1.2	96	MET	39	14

DAYLIGHT DISTRIBUTION

No-SkyLine (NSL)

Refers to the percentage of the room with a view of the sky from a working plane at desk hight.

BRE recommends the NSL to be at least 80% for the room to guarantee satisfactory daylight uniformity.

Room Depth Criterion (RDC)

Defines adequate room proportions that enable good distribution of light. It applies to rooms lit by windows in one wall only.

MET : The room meets the Room Depth criterion

NOT MET: The room does not meet BRE's RDC

N/A (Not Applicable): The room is not lit by windows in one wall only, and cannot be assessed by BRE's RDC

KEY TO UNDERSTANDING THE TABLES - SUNLIGHT

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION		SUNLIGHT QUANTUM (PROBABLE SUNLIGHT HOURS)	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC	ANNUAL	WINTER
Building C - SIXTH FLOOR						
686	L/K/D	2.8	99	N/A		
687	L/K/D	2.5	100	N/A	78	27
688	Bedroom	1.1	90	MET		
689	Bedroom	1.4	87	MET		
690	Bedroom	1.4	89	MET		
691	Bedroom	2	85	N/A		
692	Bedroom	1.6	82	MET		
693	Bedroom	1.4	95	MET		
694	Bedroom	1.6	98	MET		
695	Bedroom	2.2	93	N/A		
696	Living Room	2.6	100	N/A	56	24
697	Bedroom	2.5	100	N/A		
698	Bedroom	2.3	97	MET		
699	L/K/D	1.3	95	MET	57	28
700	Living Room	1.8	96	N/A	64	27
701	Bedroom	1.4	98	MET		
702	Living Room	1.2	96	MET	39	14

SUNLIGHT QUANTUM

Probable Sunlight Hours (PSH)

Refers to the average of hours during a year in which a surface receives direct sunlight (%).

BRE states that sunlight is most appreciated in living areas and the greatest expectation of sunlight is within south facing rooms. PSH assessments therefore consider all of the living rooms with a main window facing within 90 degrees of due south.

Annual Probable Sunlight Hours (APSH)

BRE recommends at least 25% of Annual Probable Sunlight Hours for rooms where sunlight is expected.

Winter Probable Sunlight Hours (WPSH)

BRE recommends at least 5% of Winter Probable Sunlight Hours for rooms where sunlight is expected.

Water Lane Building - First Floor

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION		SUNLIGHT QUANTUM (PROBABLE SUNLIGHT HOURS)	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC	ANNUAL	WINTER
WATER LANE BUILDING - FIRST FLOOR						
1	Bedroom	3.2	92	MET	17	2
2	L/K/D	5	100	N/A	65	24
3	L/K/D	5.5	100	N/A	98	29
4	Bedroom	5.8	99	MET	72	25
5	Bedroom	5.8	99	MET	72	25
6	L/K/D	5.3	100	N/A	72	25
7	L/K/D	0.9	99	NOT MET	5	0
8	Bedroom	3.7	99	MET	22	3
9	Bedroom	2.8	98	MET	5	0
10	Bedroom	4	98	MET	22	3
11	L/K/D	0.9	97	NOT MET	5	0
12	Bedroom	3.7	99	MET	22	3
13	L/K/D	1	99	NOT MET	5	0
14	L/K/D	1	99	NOT MET	5	0
15	Bedroom	3.6	100	MET	21	3
16	Bedroom	3.7	99	MET	21	3
17	L/K/D	0.9	99	NOT MET	4	0
18	L/K/D	1	99	NOT MET	4	0
19	Bedroom	3.7	100	MET	22	3
20	Bedroom	3.6	99	MET	22	3
21	L/K/D	0.9	99	NOT MET	5	0
22	L/K/D	5.3	100	N/A	38	5
23	Bedroom	4.8	98	MET	16	2

Table 02: Assessment Data

Fig. 03: Floor Plan

Water Lane Building - Second Floor

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION		SUNLIGHT QUANTUM (PROBABLE SUNLIGHT HOURS)	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC	ANNUAL	WINTER
WATER LANE BUILDING - SECOND FLOOR						
24	L/K/D	7.6	100	N/A	40	18
25	L/K/D	7.7	100	N/A	86	29
26	Bedroom	3.3	99	MET	51	22
27	Bedroom	3.4	100	MET	57	20
28	L/K/D	7.9	100	N/A	66	23
29	L/K/D	3.4	100	MET	12	2
30	L/K/D	2.3	98	MET	9	0
31	Bedroom	4.5	100	MET	12	2
32	Bedroom	4.5	100	MET	13	3
33	Bedroom	2.9	100	MET	13	3
34	L/K/D	3.2	100	MET	12	2
35	L/K/D	3.2	100	MET	12	2
36	L/K/D	3.2	100	MET	12	2
37	L/K/D	3.2	100	MET	12	2
38	L/K/D	8.4	100	N/A	28	3

Table 03: Assessment Data

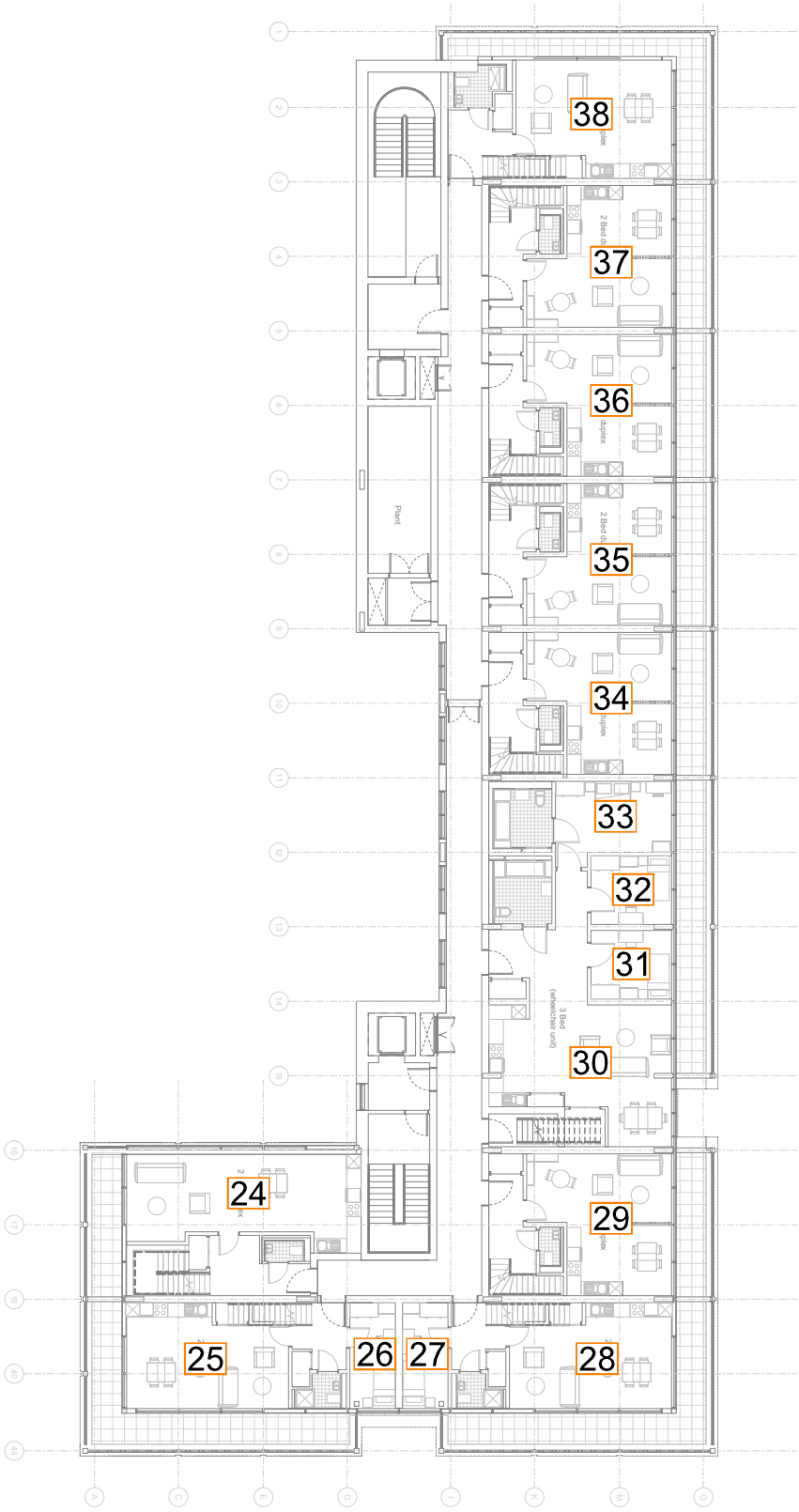


Fig. 04: Floor Plan

Water Lane Building - Third Floor

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION		SUNLIGHT QUANTUM (PROBABLE SUNLIGHT HOURS)	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC	ANNUAL	WINTER
WATER LANE BUILDING - THIRD FLOOR						
39	Bedroom	0.6	94	MET	1	0
40	Bedroom	0.6	93	MET	1	0
41	Bedroom	0.9	89	MET	11	6
42	Bedroom	1	89	MET	11	6
43	Bedroom	3.8	95	MET	22	0
44	Bedroom	3.9	95	MET	22	0
45	Bedroom	3.9	95	MET	25	3
46	Bedroom	3.9	95	MET	22	0
47	Bedroom	3.8	94	MET	25	3
48	Bedroom	0.8	94	MET	1	0
49	Bedroom	2.9	96	N/A	87	27
50	Bedroom	2.8	96	N/A	87	27
51	Bedroom	2.8	96	N/A	87	27
52	Bedroom	2.8	96	N/A	87	27
53	Bedroom	2.2	96	MET	85	25

Table 04: Assessment Data

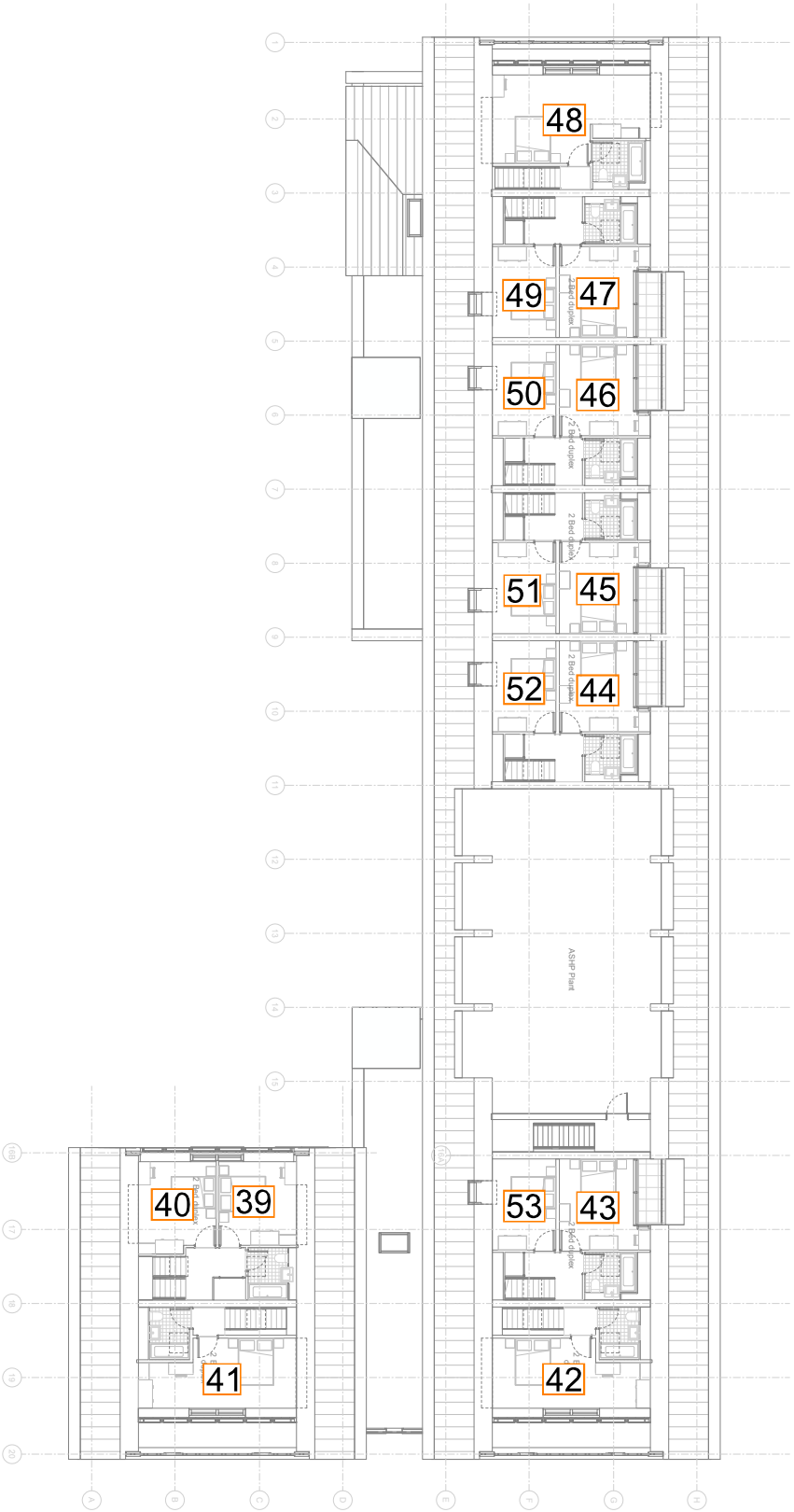
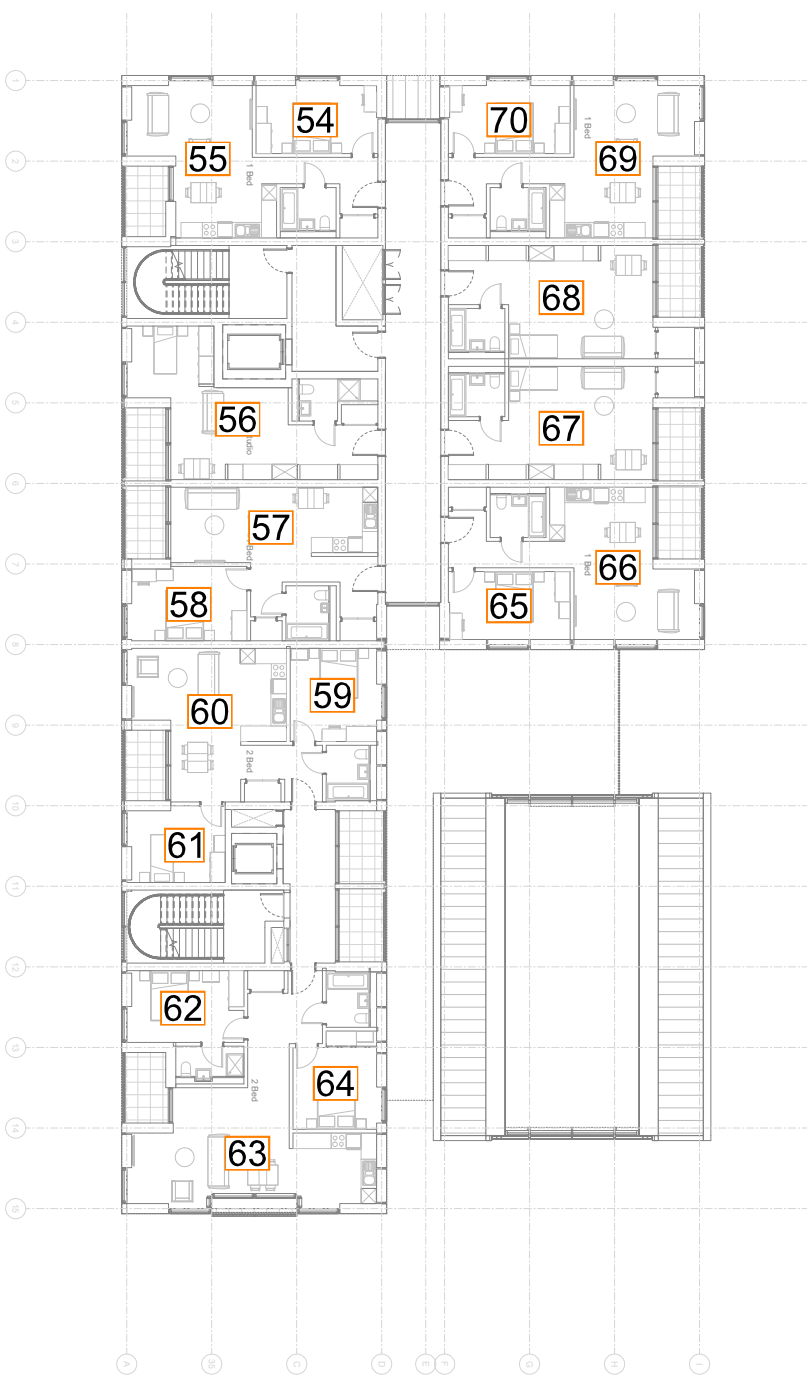


Fig. 05: Floor Plan

Wharf Lane Building - First Floor

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION		SUNLIGHT QUANTUM (PROBABLE SUNLIGHT HOURS)	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC	ANNUAL	WINTER
WHARF LANE BUILDING - FIRST FLOOR						
54	Bedroom	3.3	97	MET	21	2
55	L/K/D	3.7	100	N/A	68	24
56	Studio	2.3	99	N/A	68	24
57	L/K/D	1.6	98	NOT MET	35	14
58	Bedroom	2.3	98	MET	69	25
59	Bedroom	2	88	MET	25	4
60	L/K/D	2.7	99	N/A	69	25
61	Bedroom	1.8	100	MET	69	25
62	Bedroom	2.8	98	MET	69	25
63	L/K/D	6.7	100	N/A	100	30
64	Bedroom	2.4	93	MET	26	4
65	Bedroom	2.3	81	MET	41	4
66	L/K/D	4.4	100	N/A	59	11
67	Studio	1.5	97	MET	7	0
68	Studio	1.5	97	MET	7	0
69	L/K/D	4.6	100	N/A	49	7
70	Bedroom	3.3	96	MET	21	2

Table 05: Assessment Data



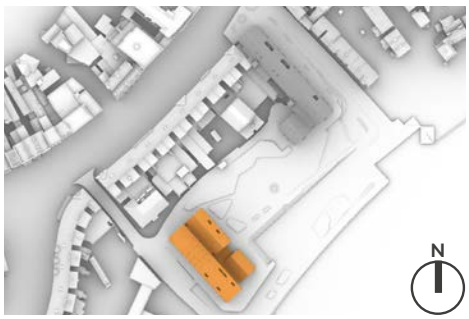
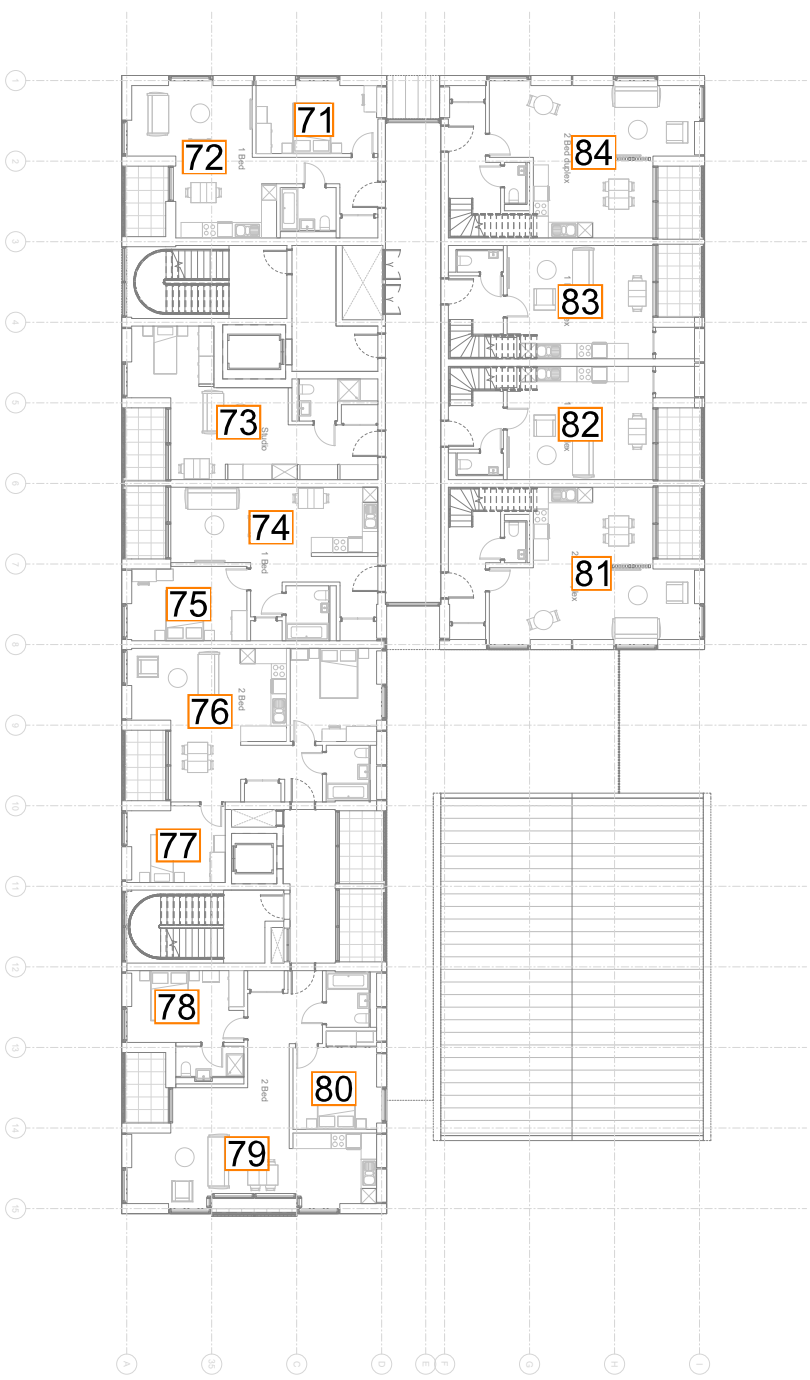


Fig. 06: Floor Plan

Wharf Lane Building - Second Floor

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION		SUNLIGHT QUANTUM (PROBABLE SUNLIGHT HOURS)	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC	ANNUAL	WINTER
WHARF LANE BUILDING - SECOND FLOOR						
71	Bedroom	3.3	96	MET	22	3
72	L/K/D	3.9	100	N/A	69	25
73	Studio	2.4	99	N/A	69	25
74	L/K/D	1.7	98	NOT MET	36	15
75	Bedroom	2.5	96	MET	69	25
76	L/K/D	2.5	99	N/A	96	29
77	Bedroom	3	97	MET	69	25
78	Bedroom	3	97	MET	69	25
79	L/K/D	6.8	100	N/A	100	30
80	Bedroom	3.1	96	MET	27	4
81	L/K/D	4.3	100	N/A	63	16
82	L/K/D	1.9	96	MET	7	0
83	L/K/D	1.8	96	MET	7	0
84	L/K/D	4.6	100	N/A	47	7

Table 06: Assessment Data



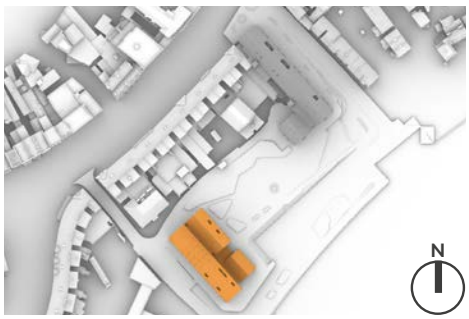
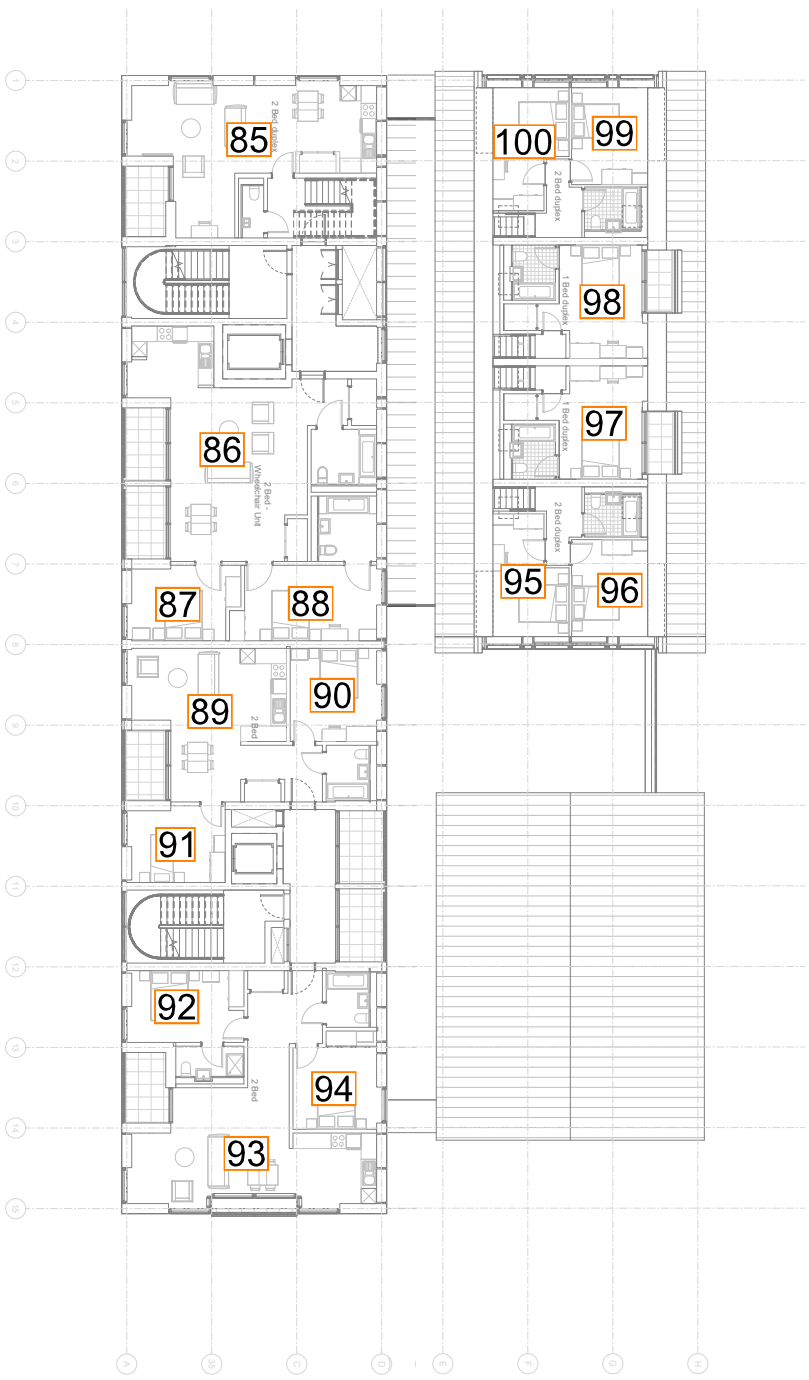


Fig. 07: Floor Plan

Wharf Lane Building - Third Floor

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION		SUNLIGHT QUANTUM (PROBABLE SUNLIGHT HOURS)	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC	ANNUAL	WINTER
WHARF LANE BUILDING - THIRD FLOOR						
85	L/K/D	4	100	N/A	69	25
86	L/K/D	3	99	N/A	69	25
87	Bedroom	3	97	MET	69	25
88	Bedroom	1.7	92	MET	24	4
89	L/K/D	2.4	98	N/A	69	25
90	Bedroom	2.8	98	MET	25	4
91	Bedroom	3	94	MET	69	25
92	Bedroom	3.2	95	MET	69	25
93	L/K/D	6.9	100	N/A	100	30
94	Bedroom	3.2	96	MET	25	4
95	Bedroom	0.9	86	MET	7	6
96	Bedroom	1.2	92	MET	8	7
97	Bedroom	3	94	MET	22	1
98	Bedroom	3	94	MET	22	1
99	Bedroom	1.2	96	MET	5	1
100	Bedroom	1.2	95	MET	5	1

Table 07: Assessment Data



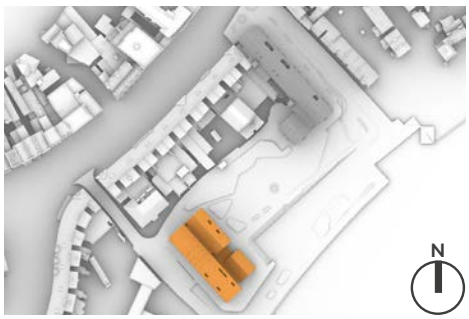
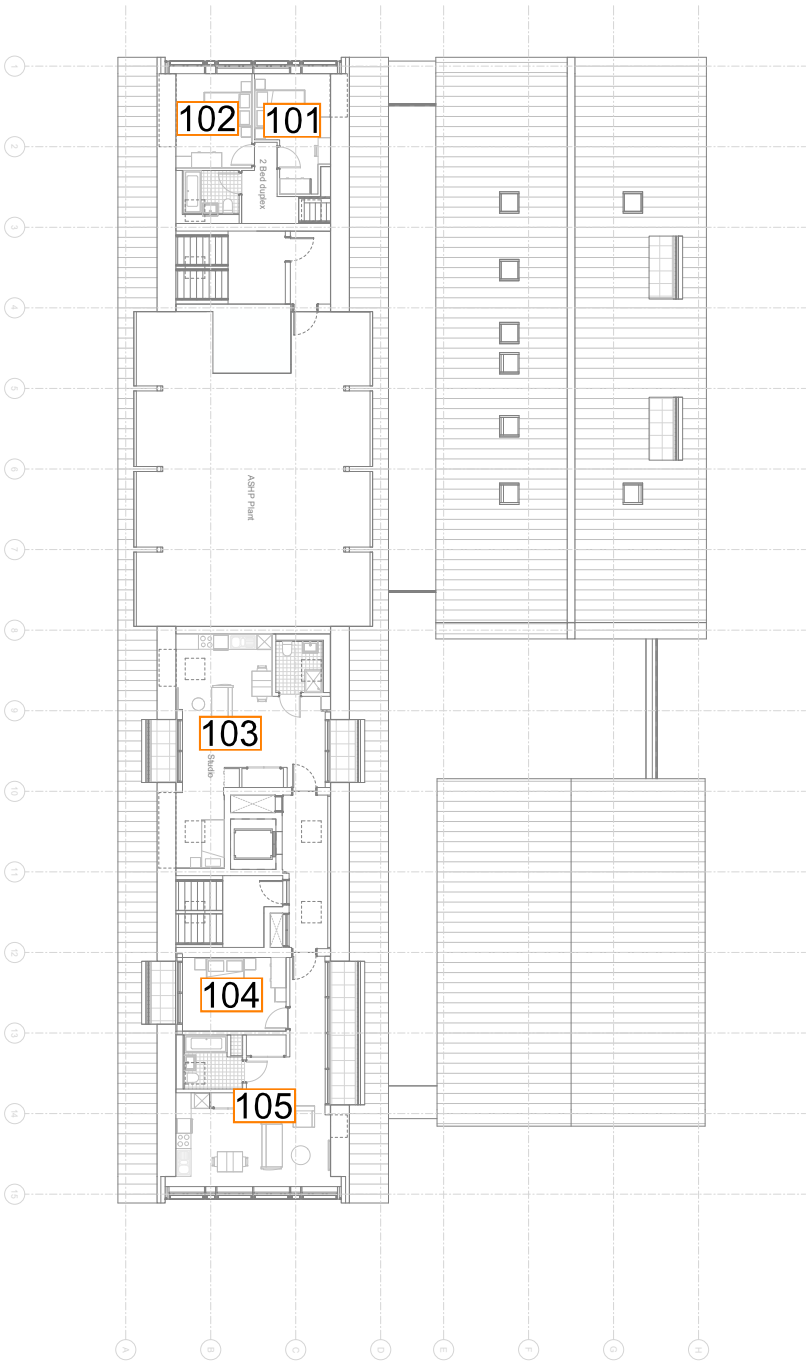


Fig. 08: Floor Plan

Wharf Lane Building - Fourth Floor

		DAYLIGHT QUANTUM	DAYLIGHT DISTRIBUTION		SUNLIGHT QUANTUM (PROBABLE SUNLIGHT HOURS)	
ROOM REF.	ROOM USE	ADF (%)	NSL (%)	RDC	ANNUAL	WINTER
WHARF LANE BUILDING - FOURTH FLOOR						
101	Bedroom	1.2	94	MET	5	1
102	Bedroom	1.2	96	MET	5	1
103	Studio	2.8	94	N/A	88	24
104	Bedroom	3.7	100	MET	91	27
105	Studio	4.2	100	N/A	37	15

Table 08: Assessment Data



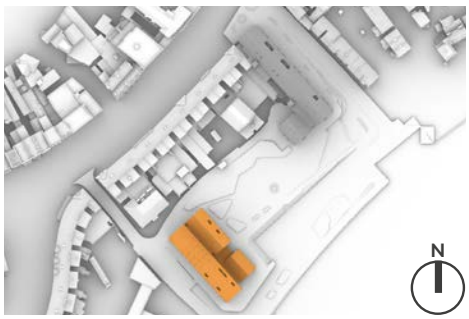


Fig. 09: Floor Plan

8 OVERSHADOWING ASSESSMENTS

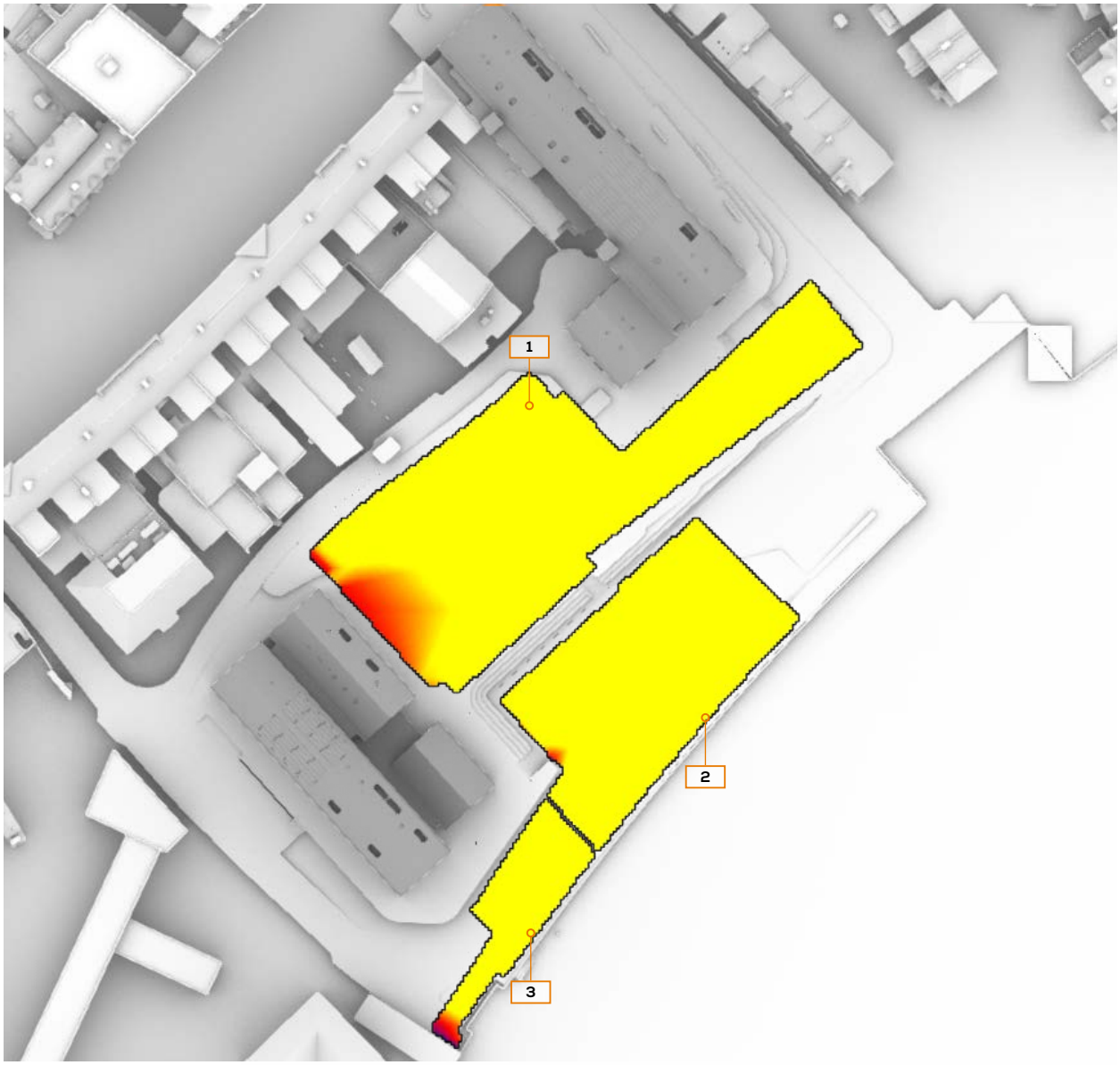
OVERSHADOWING ASSESSMENT - EXTERNAL COMMUNAL AMENITY AREAS
SUN HOURS ON GROUND - BRE TEST - 21ST MARCH

(BRE RECOMMENDS 2+ HOURS OF SUNLIGHT ON 21ST MARCH FOR AT LEAST 50% OF THE OPEN SPACE)

SUN HOURS ON GROUND
BRE TEST - 21ST MARCH

AREA	% AREA SEEING 2+ HRS OF SUNLIGHT ON 21ST OF MARCH
1	100
2	100
3	99

OVERSHADOWING ASSESSMENT - EXTERNAL COMMUNAL AMENITY AREAS
SUN EXPOSURE ON GROUND - 21ST MARCH



SUN EXPOSURE
TOTAL HOURS

0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5 5.5 6.0+

21st MARCH
(SPRING EQUINOX)

LONDON

Latitude:	51.4
Longitude:	0.0
Sunrise:	06:02 GMT
Sunset:	18:14 GMT

Total Available Sunlight:
12hrs 12mins

OVERSHADOWING ASSESSMENT - EXTERNAL COMMUNAL AMENITY AREAS
SUN EXPOSURE ON GROUND - 21ST JUNE

SUN EXPOSURE
TOTAL HOURS

21st JUNE
(SUMMER SOLSTICE)

LONDON

Latitude:	51.4
Longitude:	0.0
Sunrise:	04:43 GMT
Sunset:	21:21 GMT

Total Available Sunlight:
16hrs 38mins

gia
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